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S M I T H ' S

IMPROVEMENT

ON THE

MAGNETIC NEEDLE.

AN
IMPROVEMENT
IN THE
MARINER'S AND SURVEYOR'S
COMPASS NEEDLE;

WHEREBY

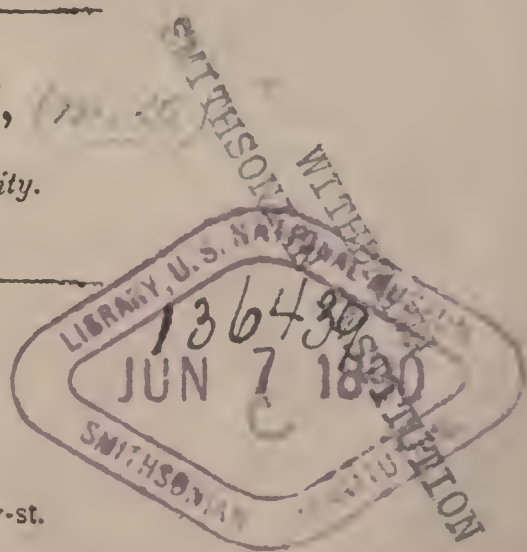
The Magnetic and Electric Fluids are so disposed as to prevent Local Attractions; also, the Derangement of the Needle, by the firing of Cannon and other violent Concussions, may be immediately corrected with very little inconvenience, or delay, &c. &c.

BY M. SMITH,
Physician, Washington City.

NEW-YORK:

R. Tyrell, Printer, 26 Vesey-st.

1834.



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REPORT OF THE COMMISSIONER OF THE GENERAL LAND OFFICE

FOR THE YEAR 1873



AN

IMPROVEMENT

ON THE

MARINER'S AND SURVEYOR'S COMPASS NEEDLE.

THE author's Improvement of the Compass Needle is the result of many years' inquiry, and intense investigation of the laws of the science termed *magnetism*, and its close connexion with that of *electricity* and *galvanism*, and their joint influence and effects in the government of the needle.

In consequence of the little knowledge that had been shed upon the world on this subject, he labored under many inconveniences and embarrassments, but, by repeated experiments, at length arrived at the desired result of making and charging a Compass Needle in such a manner as to enable the navigator and surveyor to direct their course with unerring certainty. This discovery will, no doubt, be duly estimated by all those who are sensible that most of the needles in common use, differ with each other in their directive course, and show a very irregular variation from the true meridian. In consequence of this variation, many ships, with cargoes of immense value, have doubtless been lost. By means of this improved needle, a number of disputed land-claims have been satisfactorily settled, thereby saving troublesome and expensive litigation.

When it is considered that the most scientific have but an imperfect view of the laws of magnetism, it would be absurd to suppose that every manufacturer of compass needles should possess the knowledge requisite to regulate the government of this subtle, mysterious matter. In addition to the imperfection of the common needles, arising from their ill construction, it may be observed, that they are sometimes made of improper materials. Of about one hundred compasses put in charge of the author, by order of the Board of Navy Commissioners, for the purpose of being furnished with his improved needles, twelve of those they then contained were made of iron, and which are now in his possession.

Without further remark at present, the author proceeds to lay before the public testimony of the highest order, in confirmation of his claims to the improvement set forth.

Letter from Ed. P. Kennedy, Captain U. S. Navy.

“ UNITED STATES FRIGATE JAVA,
Hampton Roads, May 15, 1831.

“ Sir, I have given your improved Compass Needle full proof, during my stormy trip in the Brandywine Frigate. to Mahon from this Roadsted, and I have no hesitation in declaring, that the improvement you have made in the mariner's compass

needle, with the shifting feeders, the electric or concussion rod, is of very great importance to navigators. I had many compasses on board, and, as usual, all disagreed, and by a single stroke with the electric rod, they all agreed and were restored to their magnetic power. I feel very confident that all those who may use your needles, will give a decided preference to them, and in a short time no other needles will be in use. Your obedient serv't,

EDM'D. P. KENNEDY.

"P. S. Request the Commissioners to let you have a copy of my report to them, it is fuller. E. P. K."

The author, now in New-York, regrets that he has not at hand a copy of this report. He is informed that, since his absence from the seat of government, several similar reports from Navy Officers have been transmitted to the Board of Commissioners. These, perhaps, may hereafter be laid before the public.

Letter from Professor F. R. Hassler, who is at present in the employ of the government, in surveying the coasts of the United States.

"Sir: As the statement of my opinions on the peculiarities of your magnetic needle is said to be lost. I comply with your wish to state here again the opinion which I have formerly given upon it. The application of a *rim* at the end of the needle, near to the place from which it is pointed off, will, by the principles of the magnet, have the effect of gathering the various deviating partial magnetic directions, which always exist, more or less, in a needle, and therefore give it more centrality and steadiness.

"This same collection of the partial magnetic directions will also tend to lessen the influence that may come in proximity to the needle, and therefore such substances may be near to the needle without influencing its direction. The striking of the needle, as well as any other concussion, will change its magnetic power or direction, according to the manner in which it is done, either favorably or unfavorably:—therefore, a magnetic needle that may happen to be disordered, can, by a proper stroke, be brought again to its proper bearing.

"Experience has, it appears from your statement, taught to you the proper manner of applying this to the restoration of the proper magnetic direction in a disordered needle. This application is very good, and of course very useful, particularly in cases where access to other means to restore the needle would not be at hand, as on board of ships. &c.

"Both these improvements are therefore, according to my opinion, good and useful; thence, worth introducing into practice. With best wishes, your ob't serv't,

"F. R. HASSLER.

"To Mr. M. SMITH, *Washington City.* Nov. 16, 1831."

Extract of remarks made by the editor of the Franklin Institute, a periodical publication in Philadelphia, on the Mechanic Arts, Manufactures, and all useful Patented Inventions, and general Science.

"It is well known, that from the firing of cannon, and violent concussions of other kinds, the magnetism of the compass needle becomes deranged or confused, in which state it will generally be found to have several, instead of only two poles; and its directive power is consequently destroyed. In the experiments exhibited to us by Mr. Smith, he took a needle, the directive power of which was perfect; he struck it a moderate blow, and it became deranged; on striking it transversely its power was instantaneously, and *perfectly restored*; this he repeated several times. He then placed it on a table, held it firmly down, in the manner described in his specification, and by

striking the table produced effects analogous to those which resulted from striking the needle itself. This instantaneous mode of restoring the magnetic power, which was new to us, may, it is manifest, be of incalculable importance, particularly at sea, where the safety of all on board a vessel frequently depends upon the good order of the compass needle.

“ Mr. Smith avers, that in all cases of accidental disturbance of the magnetic power, his method is effectual, and he appeared to be borne out by his experiments.— With respect to what he calls his *feeders*, he believes himself justified by long continued observation, in concluding, that they protect the needle from foreign attractions, and increase its directive power. They are now in a fair way of being tested, as there are some of them on board of our ships of war. Mr. Hassler, whose judgment in such cases is well known to every man of science, is very favorably impressed in regard to their operation, and has given a testimonial to that effect; and several other gentlemen conversant with this subject, anticipate much advantage from Mr. Smith’s inquiries.”—*Vol. VII. Feb. 1831.—No 2.*

The author, with the hope of inducing the government to pay a compensation for his improvement of the needle, proportionate, in some measure, to the advantages that would arise from it, on the 3d of Jan. 1832, petitioned the House of Representatives to that effect. The petition was referred to the Committee of Commerce; which, before acting on the subject, obtained the following certificate from Mr. Elliot, who was chief surveyor in adjusting the latitude and longitude of the City of Washington, and fixing the meridian for the capital.

“ *Washington, Feb. 14th, 1832.*

“ This is to certify that I have carefully examined two of Mr. Smith’s magnetic needles with a true meridional line, and find them *very perfect*. With regard to the “slides” for correcting the variations, &c. I know nothing of the theory, and therefore can give no opinion;—all I mean to say is, that the needles are very active, and point out the magnetic meridian *very accurately*. WILLIAM ELLIOT.”

On the 20th of Feb. the Committee made the following Report :

“ The Committee of Commerce, to whom was referred the petition of MOSES SMITH, have examined his improvement for adjusting the polarity of the needle in mariner’s compass. Tho’ simple in its character—they have no doubt of its great utility to mariners, and that the discovery is worthy the patronage of the Navy Department.”—Read and concurred in by the House.

“ *Navy Department, 26th Nov. 1832.*

“ Sir: Your letter of the 7th inst. has been received, and in reply have to state that I am happy to find that your improvement of the mariner’s and surveyor’s compass needles are approved by the Navy Board, and shall be pleased to aid in their adoption in the Navy, on all suitable occasions. I am, very respectfully, your ob’t serv’t,

“ Doct. M. SMITH.”

“ LEVI WOODBURY.

It will be seen, by reference to Capt. Kennedy’s letter, that the improved needle had been, for a considerable time, in use aboard some of our public ships. And it is due to Com. Rodgers, for the author here to remark, that on his first presenting his needle to the Board of Navy Commissioners, and making a few experiments upon it, the Commodore instantly perceived the great advantage that would result from the improvement, and recommended its immediate adoption by the Board. Its introduction

into the Navy, therefore, is deemed to be owing, in a great measure, to the warm interest he took in its behalf.

At the date of the following document, two new Commissioners had been appointed to the Board, and, for their satisfaction, still further experiments were deemed desirable to test the superiority of the improved needle.

Letter from Lieut. Charles Wilkes to Com. Rodgers.

“ Washington, 20th May, 1833.

“ Sir, I have the honor to report, agreeably to your instructions relative to the examination of the improved needles of Doct. Smith, that I have had them for some time past under examination, and have carefully tested their qualities by a variety of experiments, and believe them to be very superior to the common needles now in use.

“ In the manufacture of the common needles, there has always been great neglect, both in providing a suitable material and adopting a regular form, it being left, for the most part to the convenience and fancy of the workmen, and the size and shape of the material, which is no doubt one of the main causes of the discrepancies observed in their actions and results.

“ This is very far from being the case with the needles manufactured by Dr. Smith; he has adopted a form which he has found, by long experience, to be the most fit, and most tenaciously adheres to it. His material is of the first quality, and carefully worked; great attention being paid to magnetising it. He also supplies his needle with what he calls *feeders*—soft pieces of iron that slide on it, placed near its ends, thereby concentrating all the small magnets (which exist more or less) near its points, giving more steadiness and a greater directive power to his needles, and avoiding, in a great degree, the local attraction to which needles may be subjected. I ascertained this last to my entire satisfaction, by subjecting the same needle, with and without the feeders, to the same attractive force in the following manner, viz. One of his needles was suspended on a fine point, placed in the centre of a number of concentric circles drawn around it, half an inch apart, on a table. When the needle was approached, armed with its feeders, I found I could approach much nearer to it with an attractive force without disturbing it, than when it was unarmed, or without the feeders. The difference I found was generally about two of the circles, or an inch, when the body approached was a strong magnet, and a much greater force to cause deviation, than they would be ever subject to on shipboard: proving, conclusively, that they were a protection or security against local attraction; and this security appeared to be in proportion as the feeders were placed near to or farther from the centre of the needle. The feeders appeared in some cases too small, the proportion between the feeder and needle not being, in my opinion, as yet well ascertained. The needles are remarkably active, and possess much more directive power than those of the common kind now in use, (with which they were compared,) when drawn aside, settling again very quickly on the magnetic meridian.

“ Doct. Smith's manner of restoring deranged needles, by concussion with his “ Electric Rod,” is simple and effective by one who is experienced—he seldom or ever failed himself; but I am not able to impute to myself so much adroitness in applying the proper degree of force required. I am disposed to think, by a little practice, it may be easily acquired; one thing is most certain, it is a manner of restoring a deranged needle, so simple and in the possession of all, that when once known, few will be willing to leave it untried.

“ I beg leave to add, that I feel indebted to Doct. Smith, for the obliging manner

in which he has shewn me the whole process of manufacturing his needles, and satisfying my inquiries, and feel confidence in recommending him to your notice, believing, from the trials and tests to which I have subjected his needles, that they are a valuable improvement, and highly deserving your patronage. With great respect, &c.

(Signed)

“CHARLES WILKES, Jun.

“*Lieut. U. S. Navy,*

“To Com. JOHN RODGERS.”
&c. &c.

“Attached to Depot Inspect.

“The Committee appointed by the Chamber of Commerce to examine the Improved Compass Needles, invented and constructed by Dr. Smith, respectfully report, That they have given the subject the consideration its importance merits, and are of opinion that the needles of Dr. Smith are superior, in many respects, to those in common use:

1st, After a close and critical examination, not only with a test needle, but by investing the needle under trial itself, it was found that the magnetic axis coincided with the axis of the needle; it must therefore, in all cases, point to the true magnetic north, which is far from being the case with needles in common use.

“2d, The directive power of the needle was found to be greater than that of other needles subjected to experiments at the same time.

3d, By means of guards of soft iron, the separate poles that always exist in all magnetised bars of steel, are brought into magnetic communication; these guards must also have the effect of sustaining the magnetic power of the needle, and making it less apt to lose its polarity when in service. On this last point your Committee, of course can only express an opinion, and leave the absolute proof of this property to be made upon needles that have been in use at sea.

“In addition to the results obtained from the use of the guards, the qualities of Dr. Smith’s needles appear to be owing to their form, and to the manner in which they are manufactured. The form being a bar pointed at each end, and having a groove cut beneath, for nearly the whole length, is such as would be most likely to cause the principal magnetic axis of the needle to coincide with the line joining the two extremities.

“It has, in this respect, the same properties with the needle of Kater, which is usually admitted to be the best that has been hitherto used. The manufacture of the bars by rolling, instead of hammering, is also seen to be beneficial, inasmuch as partial magnetism is given by the hammer that must influence the direction to which the needle shall point when suspended.

“Your committee have also examined the method proposed by Dr. Smith for restoring the magnetism of compass needles, in case it should be lost at sea. This method is founded upon correct principles, is easily acquired in practice, and must be generally successful in effecting the proposed end.

“The Committee regret that they cannot coincide with Dr. Smith in opinion, that his guard will effectually do away the influence of local attraction. The experiments performed by them have rather had the effect of convincing them that he is in error in this opinion. As, however, he maintains it with great zeal, and brings to its support both argument and experiment, it would be desirable that an experiment upon a large scale, under the very circumstances that would occur in the service. This might be done by mooring a ship in our harbor, and taking the bearings of objects on shore, while the vessel was veered around by means of springs on her cables. As there is no doubt that losses of property and life do frequently occur, from the influence

of local attraction on ships' compasses, your Committee are of opinion that such an experiment might be well worth the trial; and should Dr. Smith's views be correct, (although the Committee must say they fear it may not prove so.) one of the most important desiderata in navigation will have been attained. All which is respectfully submitted.

" New-York, 28th Nov. 1833.

(Signed)

ABRAHAM OGDEN,
JAMES RENWICK,
SILAS HOLMES,

Committee.

" Copy—Attest,

JOHN R. HURD,

" Secretary of the Chamber of Commerce.

New-York, Dec. 3, 1833."

Professor Renwick, who drafted the foregoing Report, stands high, and no doubt deservedly, in the ranks of science; and the author feels under great obligation for the candor with which he treats the subject. The report, however, states, that "The Committee regret that they cannot coincide with Dr. Smith in opinion, that his guards will effectually do away the influence of local attraction." On this point, the Committee are respectfully referred to the precise and accurate experiments made by Lieut. Wilkes, by order of the Navy Board; also to the letter of the scientific and practical surveyor, Professor Hassler, who says, "The application of a rim at the end of the needle, near to the place from which it is pointed off, will, by the principles of the magnet, have the effect of gathering the various deviating partial magnetic directions, which always exist, more or less, in a needle, and therefore give it more centrality and steadiness."

Professor Hassler was engaged in making experiments with the improved needle through the course of a week. He would not give an opinion on such a subject without thorough investigation. In fact, the author is confident in asserting, that the principle here contended for, is fully established, and no longer remains a matter of doubt. Learned men very naturally reject new hypotheses till well tested and clearly proved, and perhaps sometimes too pertinaciously oppose evidence entitled to respect.

The improved needles are all manufactured in Washington City, under the immediate inspection of the author, or, in his absence, under the care of his son, Dr. B. M. Smith, who alone possess the knowledge of charging them with a solar magnet, which aids in giving them their superiority. Also, in preparing them in such a manner as to resist, in a great measure, the influence of the various changes of the weather, and entirely to prevent injury arising from rust, to which the common needles are very subject.

Agencies will soon be appointed in all the large seaport towns of the United States, for the sale of these needles, supplied with boxes, or provided the purchasers furnish boxes, they will be fitted to them; but, in no case will they be sold without being hung and fitted for sea by the proprietors or their agents. At present, applications must be made as above, or, in New-York, to John Fellows. Improved Dipping needles will also soon be furnished.

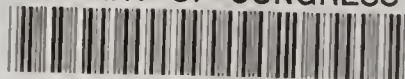
Rich. U. Marsters, Mathematical Instrument Maker, &c. corner of William-street, and Hanover square, will supply needles and boxes properly prepared.

New-York, Jan. 6, 1834.

COURSE OF LECTURES
UPON THE
STRUCTURE OF THE EARTH:
BY PROFESSOR B. SILLIMAN,
OF YALE COLLEGE.

Principal Points to be illustrated in the successive Lectures.

- A.* Elementary constitution of the earth.
- B.* Mineral masses and order of arrangement.
- C.* Natural associations of minerals.
- D.* Organic contents of the strata,—both animal and vegetable.
- E.* The records of life, from sea-weeds and shells, in the deep-seated strata, up to forests and man, on the surface.
- F.* The order of time, in which organic beings have been created.
- G.* The secondary powers which, as agents of the Creator, have produced the present condition of the earth.
- H.* Practical applications of geology in architecture, agriculture, engineering, and domestic economy.
- I.* Moral uses in proving the existence of God and illustrating his attributes.
- J.* The Genesis proved by geology to be a true history.



ELEVENTH LECTURE.—FEBRUARY 27, 1852.

Tertiary strata resumed.

Catacombs of Paris.

Tertiary of Italy, of Massachusetts, New Jersey, Maryland, Virginia, &c.

Shell rock of Florida.

Beds of oyster shells in the interior.

Forests of the tertiary era.

Lignite; buried wood; submerged forests.

River rafts. Future tertiary strata.

Opposite effects of the floods of the Mississippi and McK.

The history of animals resumed.

Local creation of animals both of early and recent eras.

The earliest mammalia hitherto found.

Miscellaneous notices of early terrestrial animals.

Elephas primigenius. Hippopotamus.

Dinotherium and Megatherium, mentioned again.

Rhinoceros and mammoth frozen in Siberia.

Cetacea. *Zyglodon* of Alabama.

Irish elk, ox-horse, carnivora, fossil fox.

Fossil remains in the Himalaya mountains; *i. e.* sivtherium, mastodon, elephant, hippotamus, rhinoceros, horse, camel, giraffe, ox, antelope, struthous birds, carnivora, crocodiles, gavials, immense tortoise, monkeys.

Living quadrumana, ourang outang, chimpanzee of Africa.

Man introduced.